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User Guide to refill Snowpulse cylinders

This manual is provided by Snowpulse SA only to people willing to learn Snowpulse cylinder refill

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1. Introduction

Thank you for your interest to refill Snowpulse cylinders. Ability to refill the gas cylinder is very useful for any person or company providing avalanche training. Guide companies, ski schools, alpine clubs, or individual customers may therefore be interested in training on refilling the gas cylinder. To refill the gas cylinder, a dedicated connector and a source of air under pressure are necessary. The pressured air source could be a scuba diving bottle or a compressor. This manual contains all details to refill your cylinder as well as important information.

2. Working pressure

The work pressure of your cylinder is marked on it. The Snowpulse “Life Bag” is designed to work at temperatures between -30 C and + 50C. The pressure gauge on the top of the cylinder allows you to simply and continuously monitor the cylinder pressure. To function properly the cylinder is designed to be filled at 20°C (= 68°F), at which point the gauge needle should be in the “green” zone. At very cold temperatures the pressure needle will remain in the “blue” zone, and at high temperatures within the “red” zone,

A cylinder with a pressure of 3’000 PSI (American Cylinder) or 300 bar (European Cylinder) at a temperature of 20°C will ensure proper inflation of the airbag for temperature range of -30°C +50°C. A pressure below at 20°C will result in incomplete inflation of the airbag and will not provide the user any protection. Variations in temperature will change the pressure of the cylinder. At cold temperatures, it’s normal that the gauge needle is in the blue area indicating a pressure lower than that checked at 20°C. This does not alter the function of the airbag.

Do not use if the pressure is over 3100 PSI (American Cylinder) or 310 BAR (European Cylinder) at 20°C as it could damage the system and injure the user.

3. Awareness of using dry air to refill your cylinder

Ensure that the air used to refill the cylinder is breathable and dry. If the cylinder contains water it may incur damage in case of freezing. Most compressors used for diving or fireman department dry the air with their filter and therefore meet this requirement. Nevertheless it is best to ensure that the one you use provides both breathable and dry air (via a filter or other mechanism). If a large bottle, such as a scuba diving bottle, is used as the source of pressurized air, ensure that it has been filled with breathable and dry air.

4. Required material

Both dry air under pressure and a connector provided by Snowpulse are required to fill the cylinder. It’s also mandatory to have a “refill kit” sold by Snowpulse. This kit contains the required O-rings, grease, tapes,…

Before manipulating the cylinder valve, the cylinder must be empty. If you need to empty the cylinder, pull the handle to release the airbag. NEVER EMPTY A CYLINDER NOT BEING FIXED TO THE BACKPACK; the airflow can create injury on part of your body while coming out.

4.1. Refill Mechanism for American cylinder (Work pressure of 3000 PSI = 207 bar)

To refill an American cylinder (work pressure 3000 PSI), it’s mandatory to use the refill mechanism provided by Snowpulse. This mechanism is composed of:

- A large gauge to monitor correctly the pressure during the refill
- An over pressure release valve. This ensure that you don’t put to much pressure inside your Snowpulse cylinder
- A special part to narrow down the airflow output of the air source (mostly for the case the air source is a scuba tank)
- A connector to plug the Snowpulse cylinder

All this components have a safety role. This mechanism must only be used to fill Snowpulse American cylinder and are design to be screwed on a DIN scuba tank.

4.2. Refill Mechanism for European cylinder (Work pressure of 300 bar)

To refill an American cylinder (work pressure 3000 PSI), it’s mandatory to use the refill mechanism provided by Snowpulse. This mechanism is composed of:

- A large gauge to monitor correctly the pressure during the refill
- A special part to narrow down the airflow output of the air source (mostly for the case the air source is a scuba tank)
- A connector to plug the Snowpulse cylinder

All this components have a safety role. This mechanism must only be used to fill European cylinders (work pressure = 300) bar and are design to be screwed on a DIN scuba tank. To use this mechanism from a scuba tank an adaptor Female-Female Din 300 bar is required.

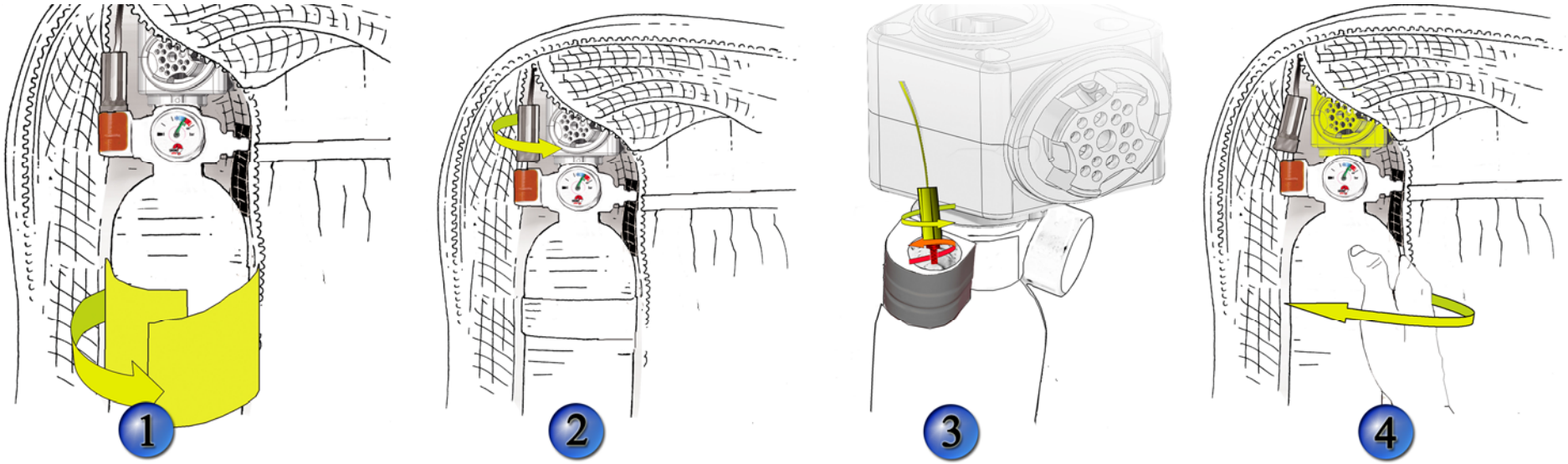
5. Important awareness

- Do not use a European mechanism (without over pressure valve) to fill an American cylinder. Filling an American cylinder with more that 3100 PSI could result in the cylinder exploding and raises a potential threat of injury or loss of life.
- Gauge being on Snowpulse cylinders must not be used as reference to check the pressure during the refill. It’s mandatory to use a large gauge as the one being part of refill mechanism provided by Snowpulse.
- Refill mechanism provided by Snowpulse contains a special part to narrow down the airflow output of the air source (scuba tank or compressor). Without this special part, it’s possible to damage the Snowpulse cylinder if the airflow output coming form the air source is too large. Refill of the cylinder with a Snowpulse refill mechanism takes around 1-2 minutes. This special part is mostly required when the air source used to fill the Snowpulse cylinder is a scuba tank (and not a compressor).

6. Instructions for filling the gas cylinder

6.1. Remove the cylinder from the backpack, please see pictures at end of document

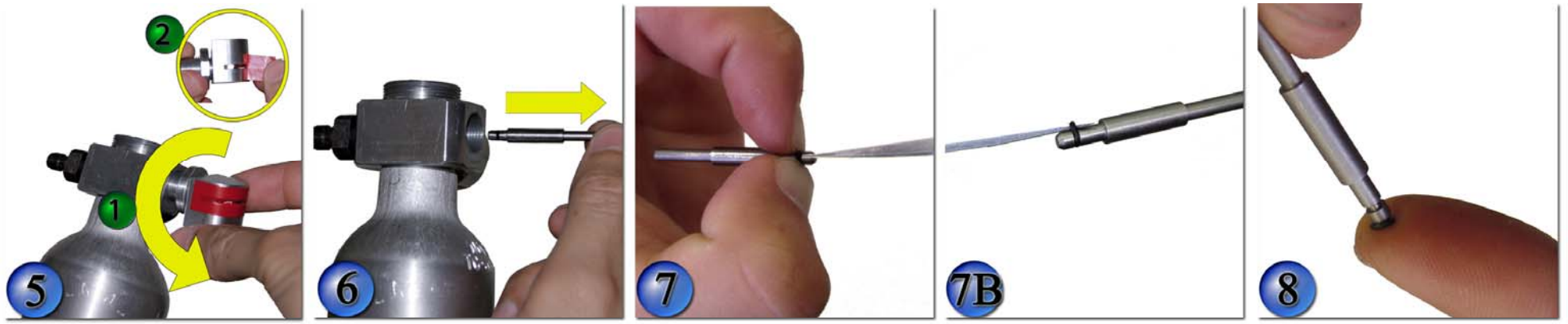
1. Open the backpack and the pocket containing the cylinder. Then open the Velcro holding the cylinder.
2. Unscrew the cable hose
3. Unscrew the pin of release being at the end of the cable
4. Unscrew the bottle from the Venturi Box. This should require little strength. The cylinder is now in your hand.



If the purpose is only to refill a cylinder that has lost some pressure but that is not empty, go to point 6.3. If you need to empty the cylinder to proceed a check or change the O-rings, connect the cylinder again and trigger the airbag.

6.2. Prepare the cylinder for refill (to be done only with an empty cylinder), please see pictures at end of document

5. Unscrew the support piston and remove its protection tape, this step can require the used of a wrench.
6. Remove the piston.
7. Remove the old O-ring. It’s mandatory to change the piston O-ring whatever the O-ring looks still in good shape or not. It’s possible that the O-ring is not on the piston anymore, in this case have a look inside the piston hole and remove the old O-ring with the plastic tongs provided. To remove the O-ring it is important NOT TO USE ANYTHING SHARP (knife, etc...) as it may damage the surface and create leaks thereafter. To remove the O-ring, nip this one with your nails to create a small loop with the O-ring, and then glide the tongs provided inside the loop.
8. Put a new O-ring. Use one of your fingers as support for the O-ring and gentle push the piston inside this one. Before putting on a new O-ring, put grease on the piston. Use only the grease provided by Snowpulse as O-rings can be damaged by other grease type. Grease should be put on and around the O-ring, including on the piston. The goal is to avoid getting water or humidity into the system, creating the risk of freezing.
9. Put grease on both the lever and the release pin. Then turn the lever until having its hole aligned with the hole for the pin of release, use the pin of release to push the lever once this one is inside the slit. Use the pin of release and the piston to align the lever.
10. Lock the lever using the release pin. The lever should not rotate anymore if you try to push with the piston. Ensure that the release pin is completely pushed in its hole.
11. Put the yellow cap to maintain the pin of release in place for the next steps.
12. Clean the support piston to remove any trace of the old tape and any trace of grease. Remove also the old tape on the top of the cylinder. Then put the 2 new tapes. Purpose of those tapes is to avoid water penetrating the system. Take care that the tapes completely covers the lip and the hole.
13. Tighten the support piston ring until the end of its threading.
14. Tighten the support piston completely and then unscrew it until the pin of release is aligned with the top of the cylinder. Then screw the ring to tight the support piston in place.
15. Put the yellow cap on the top of the cylinder.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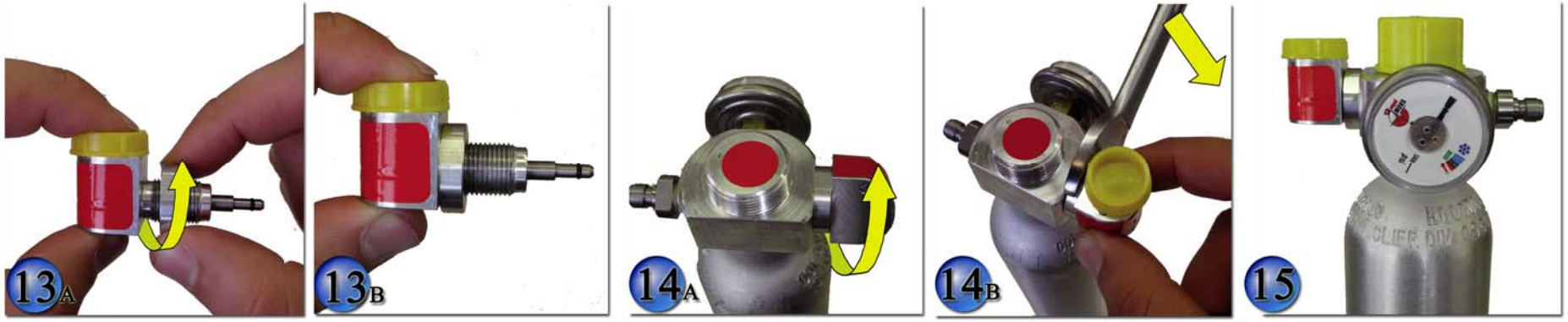
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14A
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6.3. Refill the cylinder (refer to the drawing of the opening mechanism)

16. Tight the filling mechanism onto the pressurized air source (tank or compressor)
17. Check that the draining screw of the mechanism is closed
18. Connect the cylinder to the filling mechanism
19. Open gently and **just a few** the bottle/air source valve. Don’t open to much the air source as the refill mechanism will narrow down the output.
20. Fill until the work pressure written on your cylinder is shown by the refill mechanism gauge and the cylinder gauge. Be aware that a difference of pressure between the mechanism and the cylinder gauges is possible if the air source is open too much. This difference is due to the special part to narrow down the airflow being inside the mechanism. The refill of the cylinder should take 1-2 minutes. Since refilling the cylinder warms it up, it is important to wait until the cylinder returns to a temperature near 20°C to complete its refill. It means that the refill is done in 2 steps, the second step is done when the pressure of the cylinder is stabilized around 20°C. **The cylinder gauge needle must be in the green area at the end of the refill** but THE MOST IMPORTANT IS THAT THE REFILL MECHANISM GAUGE SHOW A PRESSURE EQUAL TO THE WORK PRESSURE WRITTEN ON THE CYLINDER.
21. The cylinder being full and the AIR SOURCE VALVE BEING CLOSED, unscrew the draining screw to remove the pressurized air between the bottle valve and the refilled cylinder.
22. Remove the cylinder from the filling mechanism. If you can not do it, it probably means that the mechanism is still under pressure, check that the draining screw has been open.

7. Remarks

Commercial retailers may be subject to national regulations regarding the refilling of gas cylinders. Commercial transport is subject to the regulations for transport of dangerous goods (ADR, TPED). For any transport of the Snowpulse airbag and its gas cylinder simply disconnect the cylinder from the backpack. It is imperative to tighten the 2 yellow caps and to store the cylinder in its original polystyrene packing. Before manipulating the cylinder valve, the cylinder must be empty.

8. Upkeep and repair

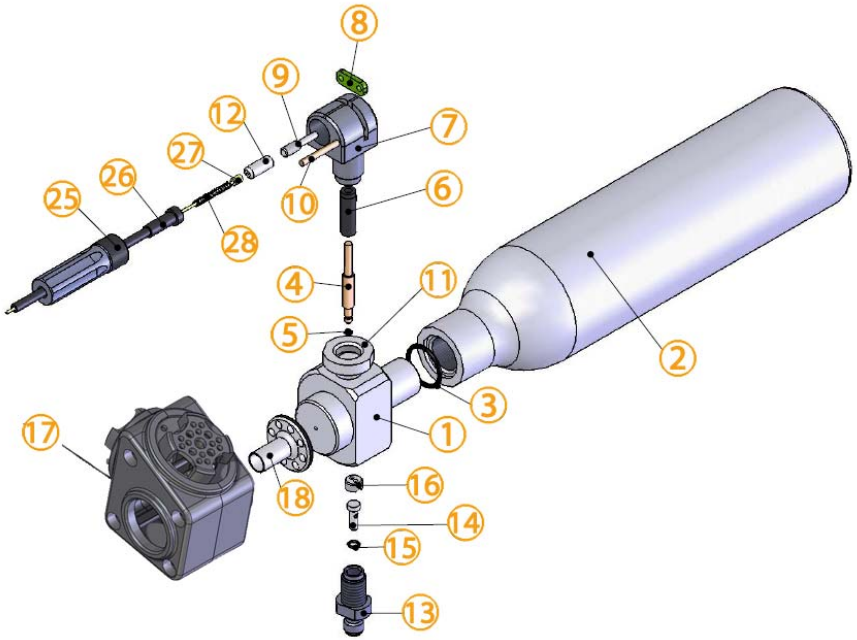
To ensure good durability and lightness, some components of your airbag are in aluminum alloy. Such parts may jam together and grease may be required. Never use strength to unfix jammed part but put lubricant instead.

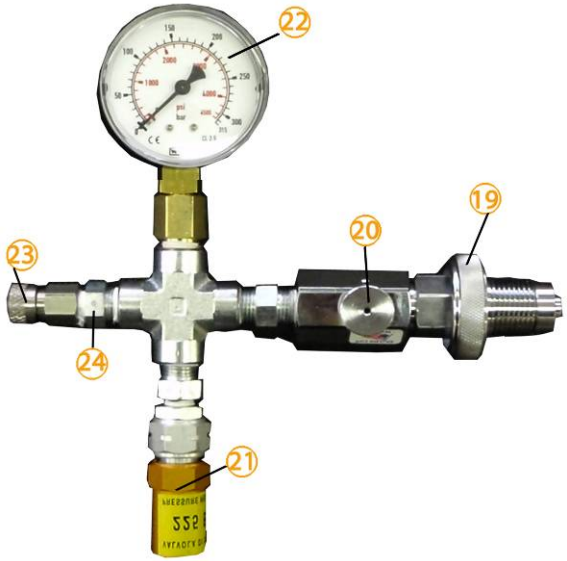
It’s also important to lubricate with grease all the parts being in motion during the use of the valve. Grease will avoid water penetration as well as ensure good durability. To lubricate O-ring, always use the grease provided by Snowpulse.

Possible deformation of the piston. Snowpulse airbag are under guaranty for 20 uses. It can happen that after several use of your airbag, a deformation of the piston jam this one within the support piston. In this case, replace the piston as soon as possible and without doing any other release.

9. Components

No.	Description
1	Cylinder frame
2	Gaz cylinder
3	Cylinder O-ring
4	Piston
5	Piston O-ring
6	Ring of piston
7	Support piston
8	Lever
9	Release pin
10	Pin for lever
11	Tightening ring
12	Connect Cable
13	Quick connector
14	Piston quick disconnect
15	Quick connector O-ring
16	Filter
17	Venturi Box
18	Conduit
19	Connection to air source
20	Draining screw
21	Over pressure release valve
22	Gauge
23	Connection to Snowpulse cylinder
24	Narrow down output part





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